U.S. Implementation of New International Water Property Standards

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International standards for the thermophysical properties of water are determined by the International Association for the Properties of Water and Steam (IAPWS). Within the past few years, IAPWS has adopted two new state-of-the-art standards for thermodynamic properties. One formulation (informally known as IAPWS-95) is designated for "general and scientific" use, and the other (known as IAPWS-IF97) is an "industrial" formulation primarily directed at the special needs (computational speed and long-term stability) of the electric power generation industry. These standards are widely used in a variety of industries and are foundational both as a reference fluid in research and as a starting point for research work in aqueous physical chemistry.

This presentation will discuss the history and development of steam tables in general and these new formulations in particular. The software distributed by NIST, which implements not only the IAPWS-95 standard for thermodynamic properties but also related standards for other properties of water (such as transport properties, dielectric constant, and refractive index), will be described. Also, the implementation of the IAPWS-IF97 formulation in both software and book form by the ASME will be described. Guidelines will be given on when it is appropriate to use which formulation, and on the possible effects of changes in the formulations on industrial design calculations. Future directions for water property standards will be discussed, including Web-based dissemination.